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Journal of the Society of Arts.

FRIDAY, OCTOBER 15, 1858.

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WRECKS AND CASUALTIES ON AND NEAR THE COASTS OF THE UNITED KINGDOM.

The Board of Trade has lately published its report under this head, compiled from returns received from the officers of the Coast-Guard, and receivers of wrecks, stationed on the coast of the United Kingdom.

The wreck experience of the year is stated to be *favourable*, but nevertheless the wreck chart, on which are laid down the localities at which the losses and casualities have occurred, and facts stated in the report, exhibit a state of things calling for serious consideration.

The tables show that there were wrecks and casualties, on and near the coasts of the United Kingdom, to the number of 1,143, representing a tonnage of 218,570 tons, and employing 9,819 hands. Of these 1,143 ships, 923 were British, and 220 foreign. The months in which the casualties took place are given as follows:—

	Vessels.
January	281
February	64
March	166
April	76
May	33
June	34
July	33
August	75
September	66
October	135
November	94
December	86
Total	1,143

The whole of the wrecks and casualties for the year are thus classed:—

Ships totally lost, exclusive of those lost by collisions	384
Totally lost in collisions	53
Seriously damaged	482
Damaged seriously in collision	224
Total	1,143

Thus the total wrecks are more than one a-day.

Of the 384 ships totally lost, 205 were wrecked from stress of weather, 66 from inattention, carelessness, or neglect, 34 from defects in the ships or their equipment, and 79 from various causes not classed.

The 482 cases of serious damage appear to have taken place under the following heads:—266 from stress of weather, 86 from inattention, carelessness, or neglect, 38 from defects in ships or their equipments, and 92 from various causes not included in the foregoing classes.

The returns show that of the total number of persons on board ships to which casualties happened, the lives of 2,206 were imperilled, 532 of whom or 24·11 per cent. were lost.

The following is the classification of the certificates held by the masters of the ships:—

Number of vessels commanded by masters holding certificates of competency—(Home trade)	79
Do. do. do. (Foreign trade)	133
Do., holding certificates of service—(Home trade)	198
Do. do. do. (Foreign trade)	97
Do. in coasting trade—masters not required to have a certificate	335
Do. commanded by masters, whether holding any and what certificate unknown	103
Do. commanded by foreigners not holding British certificates	198
Total	1,143

The report shows that the number of vessels insured was 599, at an aggregate sum of £451,513, but that 84 cargoes only were insured for £21,622; 179 vessels and 118 cargoes were reported uninsured, and of 365 vessels and 741 cargoes it is not known whether they were insured or not; 200 were in ballast. The estimated value of vessels and cargoes reported lost or damaged is stated as follows: 507 vessels, £393,859, cargoes 169, £125,442; total, £519,301. These are but approximations, the information not being complete. The following table shows the employment of the vessels lost last year:—

	Vessels.
In ballast, not colliers	138
Coal laden	382
Colliers in ballast	62
Cotton	8
Fishing smacks	15
Fish or oil	20
Grain and provisions	90
General cargo	85
Iron and other ores	88
Manure and kelp	15
Passengers	21
Potatoes or fruit	16
Salt	38
Sugar, coffee, spices, tea, molasses	10
Stone, slate, lime, or bricks	50

The site of each wreck is given in the chart which accompanies the report, and the following is a list of the principal points at which the casualties have occurred:—

Abertay	2	Kish Bank	1
Arklow Bank	2	Long	18
Barber	2	Long Scar	3
Blyth Sands	1	Maplin	3
Brake	2	Middleton	8
Burbo Bank	1	Nash	3
Cardiff Sands	1	Newcombe	2
Corton	2	Owers	2
Dogger Bank	1	Scroby	8
Dudgeon	5	Sunk	3
Galloper	4	Shipwash	5
Goodwin	18	Swin	1
Gunfleet	5	Tetney	1
Hasborough	4	Whitburn Steel	1
Herd	10	Whiting	1
Holm	10	Woolpack	1
Kentish Knock	3		

The table below shows the wrecks and casualties for 1857, compared with the five preceding years:—

Description of Casualty.	Total No. of Wrecks reported in the years						Total No. in 6 Years.	Average.
	1852.	1853.	1854.	1855.	1856.	1857.		
Wrecks	958	759	893	894	837	866	5207	868
Collisions	57	73	94	247	316	277	1064	177
Total	1015	832	987	1141	1153	1143	6271	1045

From this Table it will be seen that the wrecks and strandings reported in 1857 show—

A decrease of 9·6 per cent. as compared with 1852.
An increase of 14·1 per cent. as compared with 1853.
A decrease of 3·02 per cent. as compared with 1854.
A decrease of 3·02 per cent. as compared with 1855.
An increase of 3·47 per cent. as compared with 1856.

And that the Collisions reported in 1857 show—

An increase of 385·96 per cent. as compared with 1852.
An increase of 279·45 per cent. as compared with 1853.
An increase of 194·68 per cent. as compared with 1854.
An increase of 12·15 per cent. as compared with 1855.
A decrease of 12·34 per cent. as compared with 1856.

It appears from an inspection of the tables given in the report, that the casualties "on the East Coast during 1857 are 94 in advance of those which occurred on that coast in the preceding year—or 52·5 per cent. upon the *whole* number of casualties on the entire coasts—a very large proportion. This may, in some measure, no doubt be attributable to the great number of vessels passing and repassing along that coast; but the chief causes appear to be—the difficult and intricate navigation incidental to the rocks and sands with which that coast abounds, the want of harbours of refuge, and the dangerous system of 'follow the leader' constantly practised by colliers and coasters, whereby reference to charts, the use of the lead, and the necessity for laying down courses are neglected.

The report goes on to say:—

"A diminution appears in the number of casualties by collision, viz., 277 in 1857, against 316 in 1856. The usual causes, 'neglect to show light,' 'bad look-out,' and 'misapplication or neglect of the rule of the road at sea,' still predominate largely. Another prominent cause of collision is the difficulty of making out the way in which a ship is standing by the showing of a single bright light. The application of coloured side-lights to sailing vessels, similar to those now used by steamers, will enable a vessel to distinguish the direction in which another vessel is standing, which a single light could never do.

"The means for saving life have received considerable attention and support. There are now stationed on the coasts of the United Kingdom, 66 life-boats belonging to the Royal National Life-Boat Institution, the whole of the coxwains and crews being exercised and maintained at the expense of the Board of Trade, and paid through that Institution. The above 66 boats are in addition to the life-boats belonging to private persons, corporate bodies, and local committees unconnected with the Board of Trade, and to two boats belonging to the seamen at Hartlepool subsidised by the Board."

The sum of £1049 7s. 5d. has been expended by the Board of Trade, during the past year, for the maintenance of life-boats alone. A new arrangement for giving increased efficiency to this branch of the Service has just been concluded with the Institution, and a sum of £827 15s. 4d. has been paid to assist them in placing some new boats in situations where they were much required.

The rocket and mortar apparatus has been put in a state of efficiency. The whole of the Inspecting Commanders of Coast Guard have been communicated with on this subject, and their recommendations with reference to making such changes in the apparatus as would in their opinion adapt it to the several localities, or as to the placing of new sets of apparatus where none had previously existed, have been carefully considered and in many cases carried into effect with satisfactory results. The method of landing persons from ships in distress by means of the rocket and mortar lines has been much simplified; a uniform plan has been devised and adopted, and directions for the use of the apparatus have been extensively circulated throughout the British and Foreign merchant services. The sum expended by the Board of Trade on this account during the year is £2,751 15s. 11d., and 243 lives have been saved through its instrumentality during the same period. The total sum expended in providing means for the salvage of life on the coasts of the United Kingdom, and as rewards for meritorious services on that behalf, during the year 1857, is £5,020 14s. 3d., which sum includes the amounts already referred to as having been paid in respect of life boats and mortar and rocket apparatus; but it is exclusive of the amount expended in presenting chronometers, telescopes, and medals for individual acts of courage and humanity performed in saving and protecting the lives of persons in distress at sea.

The wreck chart shows by distinguishing marks the stations where the rocket, mortar, and life-boats are placed.

There are 141 life-boats, 66 of which are under the management of the National Life-boat Association, and 75 under other management.

There are 198 stations where the rocket and mortar apparatus is placed belonging to the Board of Trade, and under the management of the Coast Guard. These are distributed thus: England, 141; Ireland, 34; Scotland, 23.

The number of lives saved were as follows:—

By the Life-boats of the National Life-boat Institution and local bodies	398
By luggers, coastguard-boats, and small craft	512
By ships and steam-boats	507
By assistance from shore with mortar and rocket apparatus, ropes, &c.	243
By individual exertion	8
Total	1668

THE SALT TRADE.

The following memorial of the salt proprietors of Cheshire and Worcestershire united under a Chamber of Commerce for the extension and protection of the salt trade, has been presented to the Earl of Malmesbury, Secretary of State for Foreign Affairs:—

"Looking to the present state of our relations with China, and to the changes which may be expected to result from the negociations now going on there, your memorialists respectfully urge that an opening for British manufactured salt may be obtained at the various trading ports of that vast empire.

"Your memorialists cannot adduce any reliable statistics of the actual consumption of salt in China, but assuming the population at three hundred millions, it must range between one and two millions of tons. Your memorialists know that the Chinese sources of supply yield at present no tribute whatever to British commerce, whilst a most vicious fiscal system, dreaded and detested by the population of China, (a system which free admission of British salt would most effectually destroy,) compels the use of an impure and deleterious article.

"Your memorialists impress on your lordship the vast advantage to be derived by British shipping and British commerce, from additional bulky articles of export to China.

"Your memorialists also point to the success which has attended the partial admission of British salt into India, and although restricted to the single port of Calcutta, one hundred thousand tons are now annually imported there, thus furnishing an aggregate of cargoes for 100 ships of 1,000 tons each, with one hundred and fifty thousand pounds per annum in freight, when previous to the small concession of bonding facility obtained from the East India Company in 1846, no British salt found its way to India.

"Your memorialists are convinced that, independent of the great blessing the poorer natives thus derive from the use of pure salt, the beneficial re-action upon the consumers of sugar and other comestibles in Great Britain is considerable, as it affords opportunities to traders and shipowners of bringing these articles in greater abundance, and at a cheaper rate of carriage to England.

"Your memorialists further observe that, as the balance of trade with China is largely against this country, owing to our heavy imports from thence of tea and silk, it is highly desirable that our means of paying for such necessaries should be increased, by shipments of manufactured articles, so as to lessen the necessity for the large drain of specie hitherto required to carry on our trade with China.

"On these important grounds your memorialists would therefore respectfully entreat that free admission of British salt be made a stipulation in our future dealings with the Chinese authorities, a concession which, whilst it would bring home to the poorest household in China the palpable superiority of British produce, would also greatly assist in removing those barriers of ignorance and of prejudice which have hitherto been so detrimental to the prosecution of enterprise with the Chinese people; and the most practical illustration that the cheap salt of this country is able to cope effectually with solar-made salt, notwithstanding the freight paid to British shipowners, is afforded by the fact of what has been accomplished in the Calcutta market."

The same body have also agreed upon the following memorial, to be presented to Lord Stanley, President of the Council for India:—

"That repeated representations have been made by the salt trade, addressed both to the late Honourable East India Company, and to Her Majesty's Government for the time being, upon the benefits likely to attend the full admission of British manufactured salt into the ports of India.

"That under a reconstruction of the fiscal system hitherto existing in India, which may be expected to follow the great political changes that have taken place there, an adjustment of the Salt Duties and extended arrangements for the admission of British salt into India are, in the opinion of your memorialists, objects deserving of especial consideration.

"That the privilege of importing British salt into India was only conceded practically in the year 1846, and it has been so far successful as, gradually, to lead to an import of nearly one hundred thousand tons at the port of Calcutta, where alone facilities exist under which the salt can be bonded and sold.

"That this opening of the Calcutta market establishes the fact of good British salt with the freight added being enabled to compete with native and other Asiatic-made salt, inasmuch as the cheapness and purity of the former more than counterbalances the cost of transit; and hence an additional article of export, affording an outlet to our native manufacture and profitable employment for shipping, has been secured, creating at the same time an additional demand for Indian produce in return.

Your memorialists need hardly point out to your lordship the advantage to a population like that of India having access to a supply of good wholesome salt, instead of being compelled to use the inferior native made salt, which has heretofore alone been within their reach; and your memorialists confidently believe that if bonding facilities are afforded at all the ports similar to those which exist at Calcutta, British salt would soon find its way into every part of India.

"Your memorialists would therefore most respectfully urge, as regards the treatment of English salt, that all Indian ports be placed upon the same footing relatively with the native manufacture as Calcutta, due regard being had to the differential duties which appear to exist in the different Presidencies, and that an early intimation should be given to your memorialists when such extended facilities are likely to come into operation."

The salt trade of Cheshire and Worcestershire comprises some fifty or sixty firms (amongst them several joint-stock companies, in which many hundred thousands of capital have been embarked), who now manufacture upwards of a million tons of salt per annum, affording employment to a large number of labourers and artisans —contributing £50,000 per annum to the River Weaver Trust, besides many thousands to the railways, and a large sum to the Liverpool Dock rates,—capable of almost unlimited extension as regards quantity, and of thus developing a large and valuable property. The salt proprietors contend that it is a trade well deserving the support of the Executive—and that so favourable an opportunity as presents itself for testing the Chinese markets should not be lost sight of—to say nothing of the importance of the question to the shipping of this country. The total export of salt from Liverpool last year was 624,496 tons, of which 80,312 tons went to Calcutta. This is exclusive of exports from the ports of Bristol and Gloucester.

BRITISH ASSOCIATION, LEEDS, 1858.

On the Economy of Water-power. By Joseph Glynn, F.R.S., M.Inst.C.E.

The following paper was read before the Mechanical Section:—

Although much has of late been done to facilitate and extend the employment of water as a moving power, the worthy president of this section having greatly improved his water wheels so as to obtain an increase of useful effect, and to obviate the drawbacks to which they had been subject, by means of ventilating buckets and other inventions connected with that method of applying water-power; and although several modes of applying water-pressure as a moving power have been much improved, and its use greatly increased by the inventions of Mr. Armstrong, of Newcastle-on-Tyne, for accumulating and distributing the pressure of water for working cranes, for opening dock-gates and bridges, and for other purposes where great power is required occasionally or at intervals; although he has greatly improved the pressure engine, and caused water to do duty instead of steam, and has even economised the surplus pressure of the water as it passes through the main pipe in the streets of Newcastle, causing it to print a daily newspaper before he parts with it, and, as it were, to pay a transit duty to Newcastle on its way to Gateshead, yet much remains to be done in the employment and economy of this great source of mechanical power so beautifully distributed over the three kingdoms.

Those members of this section who visited Paris during the Great Exhibition, would probably observe the various methods of applying water as a motive power which were there displayed, some of them in the form of models, but others as powerful machines intended for actual work, and capable of driving several pairs of millstones.

In this part of England, and in other manufacturing districts where coal is found, the steam engine will generally be preferred to all other prime movers, but in many parts of the British empire, more especially in Scotland and Ireland, coal is scarce and water is abundant, and is too often allowed to run to waste when its application to turn mills and to work machinery for farming purposes might save both time and money, and relieve the people from the burden of hard work that can be better performed by mechanical power than by manual labour.

Those machines produced at the Paris Exhibition, to which the writer would more particularly direct the attention of this section, are the horizontal water wheels, some of which were wrongly named turbines, whereas they were really substitutes for the machines so called.

The turbine is a machine of re-action, on the same principle as Dr. Barker's mill, or that modification of it known as Whitelaw and Stirrat's Water Mill, from which the water issues in jets, and the unbalanced pressure opposite to the orifices impels the machine, and causes it to revolve in the opposite direction, somewhat in the same way that a skyrocket is driven upwards by the force or recoil acting against the closed end of the rocket tube or case.

The name turbine is derived from the supposed resemblance of these machines to a twisted or turbinated shell. The turbines of M. Fourneyron and others are formed on this principle of re-action, having their curved vanes somewhat similar to the twisted shell.

The turbine requires considerable skill in its construction, and careful attention when it is in use; but the horizontal water-wheel is a much more simple machine, and much less liable to derangement. It is not a costly machine, and it requires comparatively little care.

These horizontal wheels are much alike in principle and in plan, although they may and do differ from each other in their details, and they also differ materially from the vortex-wheels which Mr. James Thomson well-described in an excellent paper read before this section at the meeting of the Association in Belfast, illustrated by diagrams showing their construction, which may be compared with that of Appold's pump with its action reversed. The water drives round a fan with curved vanes, having a vertical axis, and revolving in an iron case, the water escaping at the centre.

The horizontal water-wheels in the French Exhibition were much alike in principle and in plan, although they might differ from each other in their details. They generally consisted of two parts or wheels placed horizontally on a vertical axis, one wheel immediately above the other. The upper part or wheel is fixed, and serves to direct the water into the buckets of the lower one, that is to say the real water-wheel, which revolves, and the axle or spindle revolves with it.

If the fall or head of water be but little and the quantity of water large, the machine is generally fixed in masonry, but if the fall be great and the quantity small, it is generally fixed in an iron cylinder, sometimes closed at the top; the water being then brought into the side by an inclosed pipe descending from the elevated sources of the water.

The regulators which determine the quantity of water and the speed of the wheel may vary in almost every instance, some being mere wooden sluices, some being metal plates pierced with apertures like a ventilator, and some of stout leather strengthened with iron plates; the leather being in three pieces, and fitted upon conical rollers radiating from the axis.

Some of these wheels are very powerful and carry a spur wheel upon the vertical axis, surrounded by six pairs of millstones for grinding corn, driven by pinions in the usual way. Other wheels, of smaller size and greater speed, drive a single pair of millstones without the intervention of other mechanism; the axis of the water wheel being also the spindle of the millstone.

The mechanical effect of these machines when carefully made is said to equal that of an overshot or breast wheel. Messrs. Fromont state that some of their making realize 75 per cent. It is somewhat singular that those wheels which some of our engineers and mill-wrights now make for exportation, should not be used at home. The well-known firm of Bryan Donkin and Co., of London, may be mentioned as the principal makers and exporters of the horizontal wheel.

The writer has been induced to submit to the section the waste of water in so many places where it may be turned to profit, from his having recently visited some of the undulating and hilly counties bordering on Wales, where almost every valley has its stream or brook ready to do good service, and the means of making such power available at moderate cost.

On an Expanding Pulley. By J. Combe.

The following paper was read before the Mechanical Section:—

A pretty correct idea of this pulley may be formed by supposing two cones cut with radial spaces alternating with solid parts, so that the solid parts in one may slide freely into corresponding spaces in the other, in the direction of a common axis. The sizes of these radial sections are regulated so that when the two cones are put together they form a grooved or V pulley, the diameter of which varies according to the position which the cones occupy with regard to each other.

This will be at once apparent by an inspection of the models or drawings. It will also be seen that any desired amount of variation in size may be got, and this without involving the necessity of occupying a large space. This change in size is made by pressing the one into the other, which can easily be done whether the pulley be in motion or at rest. The value of the property of giving readily any amount of change in size, will be made evident, by a comparison of the results obtainable by a pair of common cones and a pair of expanders, of similar dimensions, and giving the same extremes of speeds.

A range, from one to four in diameter (or more if necessary), is easily obtainable in the expanders, and supposing the one which drives to have a speed of 80 revolutions per minute, and that it be set at 4 inches diameter, and the one which is driven to be set at 16 inches diameter, (the corresponding position,) the speed of the latter will be one-fourth of 80, or 20 revolutions per minute. When the driver is changed to 16 inches diameter, and the driven to 4 inches, the speed of the driven shaft will be increased to 320 revolutions per minute.

The changes between these extremes (20 and 320) may be of any extent, or per centage on the speed, and they can be made as gradually as is desired without stopping.

For comparison with this, take a pair of common cones, having the same extreme diameters, and having steps of two inches, which is not more than usual. When the driving strap is changed from the steps on the cones, which give the slowest speed (that is 20 revolutions per minute) to the next steps, which is the smallest change that can be made, the speed of the driven is increased to 34 revolutions per minute, that is 70 per cent. on the former speed. The change to the next steps makes the speed of the driven 53, and the increase here is 56 per cent. The third change increases it to 80, or 51 per cent. The next to 120, an increase of 50 per cent. Then to 186, by an increase of 55 per cent. And, lastly, to 320, by an increase of 72 per cent. All these changes in speed are great, and although in practice mechanics have become accustomed to them, and don't think of the loss, it is quite clear that a great waste of time must result from not being able to get smaller changes readily. For instance, suppose that a lathe or boring machine has a piece of work in it of a diameter that would require a speed between any of the speeds which the steps of the common cones give, but which will not bear the whole step, it is quite clear that in this case a loss of time and work equal to 50 or 60 per cent. may take place. To get over the difficulty attending the use of common cones, some tool makers use two pairs of driving pulleys on the counter shaft, which of course doubles the range of the cones, but this is a cumbrous arrangement, and is still very far from giving what is necessary or desirable. There are many machines in which a variation of speed is desirable, and would be used if it could be got readily; but there is often such a loss of time involved in making a change that very much slower speeds are used rather than take the trouble or incur the delay of making that change. The common cones referred to are not by any means an extreme case; on the contrary, it is quite common to make the steps even greater, and if the number of steps be less, and the extent of the range smaller, there is of course a corresponding diminution in the adaptability of the machine to different purposes.

The expanding pulley was first brought out for the purpose of giving the varying motion to the bobbins in flax and tow roving frames, to which it is applicable with great advantage, from the accuracy of its action and the small space which it occupies. By its use a very simple and correctly working machine is got, capable of making bobbins either in the ordinary way or in cops. It is equally applicable (as the cop and bobbin exhibited will testify) to the heaviest and the lightest frames.

The cop is from a tow roving frame, and is made of rove weighing 1 lea (or 300 yards) to the pound. The bobbin is filled with flax rove of 40 leas (or 12,000 yards) to the pound.

On the machines on which this bobbin and cop were filled, only one expander is used, and the band is kept at the necessary tension, either by making the expander swing in a frame, or by the use of a stretching pulley.

A very simple mode of applying a stretching pulley is to make the pulley, which does not vary, with two grooves or V's, and pass the band twice round it, putting the expander in one fold, and the stretching pulley in the other. These arrangements are applicable to many other purposes. Where two expanders are used one to drive the other, it is not necessary to have any stretching pulley, but simply to connect one or both sides of each pulley with levers, so that they may be moved simultaneously as required.

The purposes to which these cones are applicable are innumerable, and being simple and inexpensive, there is every reason to expect that when known, they will be almost as extensively used as common flat pulleys. It is thought by many that V pulleys and bands for driving purposes are objectionable, but there is some prejudice in this idea. If a round or square band will convey the power, last as long, and not be more costly than a strap, where are the objections? It has been long known that round gut bands can convey great power, and their durability and economy soon speak for themselves. There is a gut band here which was in constant use on a 60 spindle roving frame for seventeen months, and it is as good now as when it was put on, or nearly so. In such a frame, made in the ordinary way with two cones, a strap 2½ or 3 inches broad would be used.

From the great range in size which can be got with these pulleys, and the keen bite which the bands take, they are exceedingly applicable to tools of all kinds.

As an instance, a drilling machine made by Messrs. Buckton and Co., in the "Exhibition of Local Industry," now open in Leeds, may be referred to, in which, by means of a pair of these pulleys, which can be changed from 4 to 16 inches diameter, any variation of speed can be got at once from 20 to 30 revolutions per minute, or other range in a like proportion. In this machine the usual bevel wheels are made two to one in place of being equal in size, and it has no other gearing; it will, however, do nearly as great a range of work as double-geared machines of similar size. The cost is less, and the facility of change much greater.

To lathes it is equally applicable, and its peculiar adaptation to those for surfacing will be obvious.

A governor driven by it can be made to regulate an engine or water-wheel at any desired speed without stop or trouble.

It is also extremely well adapted to give the varying speed required in weaving machines, such as dressing, warping, and winding machines, and for positive giving-out and taking-up motions in looms.

These pulleys have now been in use extensively for about two years for roving frames, and can be spoken of with confidence as to their performance and value. For most purposes a round band answers very well, but where a considerable power is wanted to be transmitted, bands formed of two or more thicknesses of leather can be used.

In conclusion, it may be stated that the liability to accidents is very much diminished as it is not necessary for the attendant to touch the band while changing the speed.

ON THE APPLICATION OF COMBUSTIBLE COMPOUNDS TO BE USED IN WAR. BY J. MACINTOSH.

The following is an abstract of a communication read before the Mechanical Section:—

This paper relates to the use of coal tar, naphtha, or other hydro-carbons, alone or in combination with other materials, to be used as an agent in attack and defence; also to the application of hydro-carbons mixed with gunpowder, and brought to a plastic state by means of India-rubber or other gums, and fibrous materials, introduced into shells and other missiles; also in filling shells with coal-tar naphtha, containing potassium, for igniting when used in water, and in filling shells with coal-tar naphtha, mixed with phosphorus and bisulphuret of carbon, with bursting powder sufficient to open the shells.

To attack fortresses from seaward, an artificial dense and dark fog is generated, capable of being prolonged at pleasure, in front of the batteries to be attacked, which renders them untenable, enabling the attacking vessels to approach and destroy the works, unmolested by any hostile fire.

The diaphragm shells, filled with naphtha, phosphorus, and bisulphuret of carbon, may be used with great effect against cavalry and troops, as the bursting of the shell scatters the contents in all directions, causing their immediate disorganisation and destruction. When a shell containing the combustible material bursts in earthworks, the earth, being porous and incombustible, prevents the combustion from spreading rapidly, but allows the black vapour to ooze out gradually, causing most serious annoyance to the enemy, who are unable to extinguish the suffocating fog, and are hindered from carrying on their operations.

It may be brought to bear with most satisfactory results against an enemy encamped in tents.

PLAN FOR GIVING ALARMS IN PASSENGER TRAINS. BY J. O'NEIL.

The invention consists of an iron bar extending under each carriage, and suspended on a pin a little from the centre, so as to make one end heavier than the other.

The heavy end is securely held in a bridle, by a hanging latch at the end of the carriage.

The light end also passes through a bridle at the other end, and has a tongue which draws out from the bar, and reaches under the latch fixed on the next carriage.

By disengaging any of the latches, the heavy end falls; and the light end, in rising, throws up the next latch, and so on to the guard's van, where it rings an alarum.

A chain or wire, fixed to the latch and brought into the carriage, gives each passenger, in the event of danger, the means of giving a signal to the guard; and a duplicate set of bars, on the other side of the carriage, enables him instantly to communicate with the driver, if necessary.

The end of each tongue has a rising point, rivetted loose, so that the porter, when coupling the carriages, could put it in position for disengaging the latch, in case the carriages should become detached by the breaking of the coupling chains.

As the bars are not connected, any number of carriages can be taken off or put on at a station, by merely turning the loose point on the end of the tongue up or down.

ON SOME OF THE RESULTS OF THE SOCIETY OF ARTS EXAMINATIONS.—BY JOHN POPE HENNESSY, of the Inner Temple.

The following paper was read before the Section of Economic Science and Statistics:—

The system of examination established by the Society of Arts is well known. I do not propose referring to it further than to remark that it is intended to operate among the working classes; that no students of any of the learned professions, no graduates or undergraduates of any university, no certificated schoolmasters or pupil teachers are eligible for examination. Nor is any one qualified to present himself as a candidate who is not a member of, or a student of a class in, one of the many Institutes in all parts of the United Kingdom in union with the Society of Arts. In this way it becomes a test of the influence of institutional education. In fact it is the only direct and unequivocal test of that valuable class of education which we possess. Statistics of an interesting and useful kind have at various times been published with reference to the primary education of the working classes. Such statistical tables, however, refer to the period of school life; to the number of years spent at school and the age at which children leave school. The results of the Society of Arts examinations furnish a new class of educational facts. They deal with persons who have left the school for the workshop. They enable us to estimate the relative effects of different periods of school life. They enable us to estimate the effect which early removal from school has on that portion of the working population with which the system deals. In one of the printed forms of inquiry which each candidate at the final stage of the late examination was requested to fill up, the following questions were asked: "How many years were you at school? How many years have elapsed since you left school?" One thousand one hundred and seven candidates were examined this year, but as some of these were rejected at the preliminary examination, as others did not offer themselves for the final examination, and as some of the forms, as far as the mere educational statistics were concerned, were imperfectly filled, not more than three hundred and ten supplied the requisite information. The Council of the Society of Arts have kindly placed at my disposal all the documents referring to the examination. Neither the Council, however, nor any of the officers of the Society are answerable for either the statements of fact or the expressions of opinion which this paper contains. The first result at which I arrived was that the average period of the school life of the candidates was under that usually regarded by educationists as the normal and necessary period. Some of the ablest and most practical of Her Majesty's Inspectors of Schools have asserted that the normal period of school life is twelve years. Other educationists have estimated this period at nine or ten years; that being in fact the average duration of school life on the continent,—in Bavaria, Holland, Saxony, Prussia, Norway, Switzerland, Sweden, and many other countries. It will be seen from the following table that the great majority of the candidates were at school for a much shorter period:—

Under 1 year at school	13
1 year at school	2
2 years at school	11
3 ,, ,,	22
4 ,, ,,	32
5 ,, ,,	49
6 ,, ,,	47
7 ,, ,,	46
8 ,, ,,	40
9 years at school	21
10 ,, ,,	18
11 ,, ,,	1
12 ,, ,,	7
13 ,, ,,	0
14 ,, ,,	1
	310

The average period was therefore 6.016 years or less than 6 years and 6 days. Although this period is much less than that which we are told should be the minimum duration of school life, nevertheless it is somewhat over the average in this country. Mr. Horace Mann shows that the average school time of all the children in England and Wales is, as nearly as possible, 5 years. At the Educational Conference held last year in London, this fact was spoken of as one of the most disheartening kind. That children should be only five years at school was regarded as an evil of the greatest magnitude. Some of the distinguished educationists present at the Conference did not hesitate to charge the employers of labour with destroying the intellect of the working classes, and with preventing all mental improvement amongst the people by drawing the children from school, when they had only spent five years, on an average, under the care of a schoolmaster. Some were even found ready to advocate, as a remedy for this theoretical evil, a system of compulsory education. Similar remarks have been made in Parliament. It has been in fact assumed, almost universally, that in five years little or nothing of any practical value could be learnt. I have, therefore, paid particular attention to this period, with reference to the results of the Society of Arts examinations. The conclusion to which I have arrived are precisely the reverse of those which, on ordinary theoretical grounds, and from the general tone of educationists, we should have anticipated. Taking all the candidates who only attended at school for 5 years, 4 years, 3 years, 2 years, 1 year, or less than one year, and calling them class I.; and taking all the candidates who attended school for 6, 7, 8, 9, 10, 11, 12, and 14 years, and calling them class II., I find that 129 candidates belong to class I., and that 181 candidates are included in class II. These candidates were each examined in a certain number of subjects, chosen from a specified list of 25 different branches of science and literature. There were, therefore, 25 candidates who obtained the highest places; and to 14 of these 25 were awarded 1st prizes. I find that the highest places in 15 subjects were obtained by the candidates in class I. That is, those who had attended school only five years or under, carried off two-thirds of the first places. Of the fourteen 1st prizes, eight were taken by candidates in the first class; and only six were left for those who had spent six years or more at school. The fifteen subjects in which Class I. carried off the highest places are Arithmetic, Algebra, Mensuration, Navigation and Nautical Astronomy, Statics, Dynamics and Hydrostatics, Practical Mechanics, Chemistry, Animal Physiology, Botany, Descriptive Geography, Physical Geography, English History, French, German, and Free-hand Drawing. The subjects in which those who had attended school for six years and over carried off the highest places, are Bookkeeping, Geometry, Trigonometry, Conic Sections, Magnetism, Electricity and Heat, Political Economy, English Literature, Latin and Roman History, and Mechanical Drawing. Candidates of each class were equal for the first place in Astronomy. In estimating the value of this result, it is necessary to remember that Class I. was numerically smaller than Class II.; the two classes being in the proportion of seven to ten. It therefore appears that, in proportion to the number of candidates in each class, those whose average period of school life was only 3 years 7 months, obtained more than twice as many of the highest places as those whose average school time was 7 years 8 months. Although this result is a fact, and, as such, is probably worth volumes of speculations on the theoretical aspect of the question, yet I do not think it can justify any positive conclusion of much value. Should it be confirmed by the experience of future years, and by a still more widely-extended inquiry, it may become a question whether institutional education—to which, as a matter of course, it is almost altogether owing—ought not to be regarded as a system of popular instruction coming as fairly within the scope of Parliamentary support as the elementary education in the schools under inspection. Without, however, at present justifying a positive conclusion of any great importance, it indicates the necessity of extreme caution in discussing the education question. It would appear to show, for instance, that no fair analogy exists between the school period of a country like England, where Mechanics' Institutions are established in every town, and countries like most of those on the continent where such institutions are not to be found. It would appear to show that youthful labour and early intercourse with the world may enlarge the mind and give additional force to intellectual exertion; and it would even appear to throw a doubt over all schemes—whether compulsory enactments or prize schemes—by which children would be kept at school and prevented from proceeding to work.

The average duration of the candidates' school-life, in various parts of the country, is exhibited in the following table. In the districts marked with an asterisk special prizes were awarded to Local Boards of Examiners and Institutions, in addition to those given to the candidates:—

Name of District.	Average School-period.
*Banbury	5 years 9 months.
Berkampstead	6 „ 9 „
Blackburn	4 „ 0 „
Bradford	4 „ 3 „
Brighton	8 „ 0 „
*Bristol	6 „ 8 „
Halifax	5 „ 0 „
Ipswich	6 „ 8 „
*Leeds	5 „ 10 „
Liverpool	6 „ 2 „
*Eastern District of London	6 „ 2 „
Western District of London	7 „ 6 „
Louth	6 „ 3 „
Macclesfield	5 „ 0 „
Manchester	5 „ 8 „
Oldham	6 „ 6 „
*Portsmouth (Portsea)	4 „ 3 „
Selby	7 „ 8 „
*Sheffield	5 „ 6 „
Stockport	4 „ 6 „
Wakefield	6 „ 6 „
Wigan	5 „ 8 „
York	7 „ 3 „

SOLID INK.

M. Leonardhi, of Dresden, has invented an ink which he calls "Alizarine Ink," which he can form into cakes for convenience of transport. Liquid inks, hitherto formed into cakes by drying and evaporating, cannot be brought back to the liquid state again satisfactorily. The inventor takes forty-two parts of Aleppo galls and three parts of Dutch madder, and infuses them in a sufficient quantity of hot water. The solution is then filtered, and five and a half parts of sulphate of iron are dissolved in it, after which two parts of acetate of iron, and one and one-fifth part of liquid sulphate of indigo are added. The whole is then evaporated to dryness, and the residuum is moulded into cakes.

One part of this dry ink dissolved in six parts of hot water gives, says the inventor, an ink of first-rate quality, but one of good quality may be obtained by employing ten or fifteen parts of water to one of solid ink.

MANUFACTURE OF SALTS OF BARYTA.

A communication on this subject, by M. Frederic Kuhlmann, has recently been laid before the French Academy of Sciences, in which the author, after speaking of the important sanitary considerations involved in the subject, states that the experience of several years in his manufactories has enabled him to surmount many of the difficulties which at first stood in the way of the economical production of these salts.

The first object he had in view in his experiments was to lessen the cost of the acids, which form an important element in their manufacture, and to this end he endeavoured to condense more effectually the acid vapours, which usually escape to so large an extent in the works where sea-salt is decomposed by heat. This is effected by making them pass over native carbonate of baryta. The chloride of barium thus formed is converted into sulphate by the addition of sulphuric acid, the hydrochloric acid given off being again condensed and utilised. A large portion of the same acid, in combination with manganese, had also been hitherto unavoidably lost in the manufacture of chloride of lime, and many experiments had been made with the view of utilising the chloride of manganese thus wasted, but with very partial success. M. Kuhlmann, however, states that by a process which he describes, he is enabled to make use of this substance for the conversion of native sulphate of baryta into chloride of barium. Certain proportions of the native sulphate are mixed with chloride of manganese and charcoal, and after exposure to a very high temperature for some considerable time, insoluble sulphuret of manganese is formed, together with chloride of barium, which may be easily separated by washing. The reaction may be represented thus:—

$$\mathrm{Ba\,O,\,SO^3 + Mn\,Cl + 4C = Ba\,Cl + Mn\,S + 4CO.}$$

The chloride of iron, which is generally found mixed with the chloride of manganese, undergoes similar decomposition. The charcoal acts as a deoxidizing agent, and is converted into carbonic oxide. Only 3 or 4 per cent. of the sulphate of baryta is said to be lost in this process.

M. Kuhlmann mentions that in repairing a furnace which had been employed in this operation, a blue substance, containing neither soda, manganese, nor cobalt, had been found, and he is of opinion that this is a kind of ultramarine in which the soda is replaced by baryta.

The production of artificial sulphate of baryta from the chloride of barium obtained in the manner described above, is effected by precipitation from the watery solution of chloride. After this has been purified, diluted sulphuric acid is added to it till no further precipitate takes place. The supernatant liquid is then drawn off by a syphon, and the precipitate, after being thoroughly washed, to remove any trace of free acid, is compressed into a paste, in which state it becomes an article of commerce. The author states that he now produces at his works as much as 2,000 kilogrammes per day, and that it has been much used in various kinds of painting, distempering, and whitewashing, and he is of opinion that as it enters slowly into very intimate combination with the soluble alkaline silicates, it may serve to facilitate the rendering other pigments permanent, as well as to form a remarkably pure white paint, not liable to be acted upon by sulphuretted hydrogen.

Proceedings of Institutions.

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Bradford (Mechanics' Institute.)—A soirée was held at this Institution, on Thursday evening, the 30th September, when the prizes and certificates awarded at the last examination of the Society of Arts were distributed. Tea was served in the news-room at half-past six o'clock, and the company afterwards adjourned to the lecture-theatre, where the Rev. J. H. Ryland, president of the Institution, took the chair at eight o'clock. R. Monckton Milnes, Esq., M.P., was present as an invited guest, and among other gentlemen on the platform were the Mayor of Bradford, the Rev. Dr. Goodwin, W. E. Forster, Esq., Alfred Harris, junr., Esq., — Tyler, Esq., J. V. Goodwin, Esq., Edward Kenion, Esq., the Rev. W. R. Smith, Dr. Brereton, and Messrs. Farrar, sen., Mills, and Yewdall, members of the Town Council. The President, in stating the objects of the meeting, made some remarks on the beneficial influence which the Society of Arts' examinations are likely to exercise upon Mechanics' Institutions, by giving them increased vitality, and adapting them in a greater degree to the wants of the people. He adverted to the meeting of the British Association at Leeds, and intimated that Bradford might hope to be honoured by a visit from that august body at some future time. When that time should come, he trusted it would be shown that, as Bradford, in its material interests, had far outgrown any other town, so it must take a foremost rank in the achievements of science and intellectual cultivation. The number of members of this institution had not been this year quite so great as in former years, owing to the depression of trade. Still he believed they reached about 1,200 in number. The number of books in the library was upwards of 7,000. The President then distributed the prizes of books awarded by the Institution to the attainments of the pupils in its own classes, according to the system which was commenced in 1847 and had been regularly followed down to the present year. The award of these prizes was the result of examinations by the members of the direction and others. With reference to the Society of Arts' Examinations, the President stated that at the preliminary examination, 22 candidates, members of the Bradford Mechanics' Institution, presented themselves, of whom 18 satisfied the requirements of the Local Board. Of the 18 candidates who were examined by the papers of the Society of Arts at the final examination, 17 were successful, and received certificates.—Mr. Alfred Harris, junr., Chairman of the Local Board, then distributed the certificates. Special prizes, proposed by himself, were also distributed by Mr. Harris, to three candidates in drawing.—The President said he had received a letter from Mr. Lobley, the teacher of the drawing class, stating that the pupils in that class desired to return thanks to Mr. Harris for his generosity, encouragement, and advice during the past year. The Mayor briefly proposed the first resolution :—" That this meeting congratulates the members and friends of the Bradford Mechanics' Institute on the return of its winter session, as affording, in its various departments, renewed opportunities for the diligent acquisition of knowledge; more especially in the classes department, the importance and results of which have this evening met with public and appropriate recognition."—Mr. R. Monckton Milnes, M.P., seconded the resolution, and, in the course of his speech, offered some useful suggestions on the attainment of scientific knowledge by members of Mechanics' Institutions. Science was nothing but an active and careful examination of the works of nature around us. There was not one member of that Institution who did not come into contact with the operations of nature in one way or other in his various employments. By a careful study of those operations of nature, the first step in science was gained, and if they went from the operations of nature to those operations of applied science which were at the foundation of the great manufacturing processes in this country, they would then have learnt those principles of mechanical science which would lead them to subjects of the highest interest. Mr. Milnes said that the best thing which men of science could do to encourage the study of science in this country would be to simplify their vocabularies; but the two immense impediments to scientific inquiry were over-work and over-play.—Mr. W. E. Forster moved the next resolution :—" That this meeting desires to call the special attention of the members of the classes to the progress which the Society of Arts' scheme of Examination has made during the past year; and trusts that the success of this Institute in the recent examination may stimulate the pupils in its classes to increased exertion, in preparing for a similar examination in 1859." In reference to the Society of Arts' Examinations, Mr. Forster said that the success achieved by the candidates belonging to the Bradford Mechanics' Institution was greater than the average throughout the United Kingdom. He heartily congratulated them on that result, and hoped that next year it would be still more favourable. The Rev. Dr. Godwin briefly seconded the resolution.—Mr. Edward Kenion moved " That the members and friends of the Institute again express their great obligations to all such as give it the benefit of their gratuitous services in the instruction of its classes."—Mr. Hanson seconded the motion.—Mr. J. V. Godwin moved a vote of thanks to the President, for his conduct in the chair; the motion was seconded by Mr. Farrar, and carried with acclamation. The proceedings of the meeting were interspersed with vocal music, by Mr. Sunderland, Miss Newbound, and Mr. Briggs: Mr. Jackson presiding at the pianoforte. The whole concluded with " God save the Queen."

Crosby-Hall Evening Classes, London.—On Thursday evening, September 30th, a public meeting of the members and friends of the Evening Classes for Young Men was held in Crosby Hall, Bishopsgate-street, with the special object of distributing the certificates and prizes which were awarded to the members of that Institution by the Council of the Society of Arts, after the Examination in May last. The chair was occupied by T. Winkworth, Esq., one of the Vice Presidents of the Society of Arts; and he was supported by the Revs. F. G. Blomfield, Thomas Hugo, R. M. Martin, Dr. Zerffi, D. Blenkarne, Esq., the Honorary Secretaries, &c. The Prizemen also had seats on the platform. The Chairman expressed his regret that no more distinguished person occupied the chair on that occasion, though he felt great pride and satisfaction in representing the Society of Arts. He took the strongest interest in the operations of this Institution, which had earned so many certificates and so many prizes; and he had no doubt that the company present would make allowances for him if he failed in properly conducting the business of that evening, though he had little apprehension, as he was so well supported by the Committee and acting officers of the Institution.—The report of the proceedings for the last session was then read, from which it appeared that—

At Midsummer, 1857, there was considerable anxiety as to the prospects of the Institution. There was a considerable debt on the Institution, and the tenants of Crosby Hall had notice to quit, as the lease of the building was to be sold. A great exertion was accordingly made. Proposals were issued to raise by subscription a considerable sum, with a view of paying off old liabilities, and, if possible, of purchasing the lease. Some changes were made in the constitution of the committee, and an Endowment Committee was also appointed, who, having set apart a sum to pay off existing liabilities, endeavoured to treat for the lease of the building; but as the price set upon it far exceeded their means, they took steps to retain at least temporary possession at the same rent as heretofore. By this means the Institution was set free from its difficulties; and being thus secure as to the payment of its rent for a year or two, and relieved of its heavy incumbrances, it has been able to continue its work. During Michaelmas Term, 1857, there were 672 subscribing members, producing the amount of £262 0s. 6d. The returns of Lent and Trinity Terms were somewhat similar, as may be seen by the following table, only the receipts were not so large, as the Michaelmas account includes members who then subscribed for the whole year :—

Lent Term, 1858 : Members, 70 ; Subscription,	£223	0	0
Trinity Term, 1858 : Members, 50 ; Subscription,	£180	13	6

Thirty-three lectures and one elocutionary entertainment were delivered during the year, attended by an average of 200 persons, costing the committee, for incidental expenses, about £10, all the Lecturers giving their services gratuitously (to whom the thanks of the committee, the members, and the public, are especially due), and thus realizing directly by the sale of lecture tickets, £14 19s. 6d. At the expense of J. W. Gilbart, Esq., F.R.S., a course of lectures was given by Professor Leoni Levi, on "The Principles of Commerce and Commercial Law." The reading-room and library have not cost more than £72, including a sum of £25 paid for books, through the liberality of J. W. Gilbart, Esq., and £10 10s. the annual subscription to Mudie's Library. The rent account stands thus :—

Rent, Rates, and Taxes, for the year 1857—8	£360	0	0
Less received for lettings of Throne Room, &c.	£152	4	0
Deficiency expected from Endowment Fund	£207	16	0

A day school for boys, under the patronage of the Committee, has also been held upon the premises; at first in a class-room, and subsequently in the Throne-room. It is under the immediate care of Mr. Priestman, and promises well; the numbers having been for the first quarter, 34; for the second, 55; and for the third, 70; producing the sum of £65. This has been expended on the master and a few requisites, but it is expected that next year something will also be available for rent. The committee close their report by asking and offering congratulations upon the success which several of the members have achieved, with much honour to themselves. At the Examination held by the Society of Arts highly satisfactory results were attained, the members attaining 6 prizes, and 11 first-class, 7 second-class, and 13 third-class certificates; in consequence of which the Institution was declared by the Council of the Society of Arts to be entitled to a prize of £15, and, as a Local Board, to a further sum of £10, both of which have been received. Mr. T. R. Howard, one of the most distinguished candidates, was subsequently nominated by the Council of the Society of Arts to compete for a clerkship in H.M. Customs, and having attended a competitive examination before the Civil Service Commissioners, was placed first in the list of 12 candidates, with the additional honour of being reported by the Commissioners to have shown marked proficiency in all the required subjects of examination. At the Oxford Middle Class Examination, Mr. Edward George Clarke, otherwise favourably known in the Institution, and who was the only candidate from Crosby Hall, appeared as the very first name in the A, or English Section, and received his certificate awarding him the title of Associate in Arts. In less public ways other members have won scarcely inferior distinction; and in a department, which some may think of smaller importance, viz., the cricket-field, the members of this Institution hold a proud pre-eminence among their neighbours. Towards the close of the financial year 1857-8, it was resolved to publish weekly a journal of its proceedings, with a lecture in each number, and this has been carried on since the 26th of last June.

After the reading of the report, the meeting was addressed by the Rev. H. Blomfield, who expressed his regret that the Institution was not yet self-supporting, and urged upon those present the importance of endeavouring by every means in their power to increase the number of members.—The Rev. Thos. Hugo called the special attention of the meeting to the importance of assisting the circulation of the "Evening Classes' Journal," recently commenced. His own conviction was, that it was a most important and valuable movement, calculated to bring the Evening Classes into public notice; to produce an interchange of ideas and of information among the members; and to provide both themselves and others with a succession of valuable lectures at a nominal price. —The Chairman, being now ready to distribute the certificates and prizes, called on the Rev. C. Mackenzie, as Honorary Secretary, who said, he saw around him many topics for congratulation, and but one for regret, and this he would first notice. It was simply this, that the meeting was held in London on the 30th of September, a time at which almost all their friends were out of town. The Inauguration Dinner of the Sheriffs unfortunately took place that evening; but for that circumstance, they might have enjoyed the honour of the presidency of the Lord Mayor of London. It was indeed an occasion when the members of the Crosby Hall Institution might be proud to welcome their friends; for the circumstances under which they met were deeply interesting, and the position that they occupied was very flattering. The reputation which the Evening Classes had won at the examinations of 1856 and 1857 was fully maintained in 1858. On both of the former occasions they had carried off the lion's share of the prizes, and now again they occupied the highest place. This was the only institution to the members of which more than three prizes or more than five first-class certificates had been assigned; and this had received six prizes and eleven first-class certificates. This was the only one that carried off twenty-nine certificates. And it was well worth noticing that in addition to £24 given to the young men, the Society had awarded, agreeably to the laws under which the Examination was conducted, the sum of £15 to the Institution; being £5 for each first prize, and £10 to the Local Board, as having sent up the greatest number of first-class prizemen in proportion to the number of candidates. The latter sum would be set apart to meet the expenses of the "Evening Classes' Journal." After some general remarks upon the benefit which accrued to the candidates and to society generally by these examinations, Mr. Mackenzie introduced the several prizemen, one by one, detailing the degrees of distinction that they had obtained on this and former occasions; and the Chairman, with a few kind and earnest words of encouragement to each, handed them their first-class certificates and prizes. Mr. Mackenzie then introduced others who had received certificates, but to whom no pecuniary reward had been accorded; observing that, however agreeable to receive such substantial compliments, the distinction was valuable simply as a distinction, and would be duly prized by the young men present. They were well aware that the civic crown of oak had stimulated the citizens of Rome to earn the approval of their country, and that the ivy and the laurel wreath which rewarded the exertions of the victor at Athens and at Corinth, had ennobled throughout the world those who had received it. With regard to those who had only succeeded in obtaining certificates of competency, he wished to say, in reference to one subject, French, that there might be a reason for the French pupils not having won so much distinction this year as heretofore. The Council had required the knowledge of French history, as well as of the French language; and some of the best scholars, feeling that this was a portion of study to which they had not been introduced, and not willing to incur the imputation of a comparative failure, had declined to appear before the Examiners. Mr. Mackenzie then introduced to the meeting Mr. E. G. Clarke, who was the only one of their members who had presented himself as a candidate before the Oxford Examiners, and who had received the high distinction of being named the very first in class A, or English Literature, together with the title of Associate in Arts. In the present year, having other things in hand, he had not appeared before the Society of Arts, and therefore had not been among the prizemen on this occasion; but the Committee of the Evening Classes wished to testify their satisfaction at his progress. They desired to present him, through the Chairman, with a cheque for £5 5s. They had ordinarily no funds for such a purpose, but an excellent friend, Mr. Gilbart, had indicated that a part of a liberal donation which he gave last year should be appropriated to such a purpose, and the Committee felt there could not be a better use of it. After the Chairman had presented it, Mr. Clarke returned thanks, and expressed his conviction that no man could stand for a few moments on that platform to receive the words of approbation from the Chairman, without resolving still to pursue distinction, and to strive better to deserve the approbation of his friends and neighbours. He then warmly advocated the cause of the "Evening Classes Journal," and asked leave to propose a vote of thanks to the Local Board, who had conducted the preliminary examination, which having been seconded by Mr. Machell, was unanimously carried.—The Rev. R. Whittington being called on to reply, said, that he placed the greatest value on the preliminary examinations, which it was the duty of the local board to institute; and that he attributed the marked success which their members had obtained, to the honest way in which these examinations had been conducted.—The Rev. F. G. Blomfield desired to express their obligations to the Committee of Management, and especially alluded to the exertions of his friend, Mr. Mackenzie, who had for so many years given so much time, and care, and labour to this work. Accordingly, in terms of high eulogium, he proposed a vote of thanks to the Committee of Management and the Honorary Secretary.—This was acknowledged by Mr. Mackenzie, who spoke in high terms of the valuable assistance he had received from Mr. Whittington and the Committee, and concluded by proposing a vote of thanks to the Chairman and the Council of the Society of Arts.—In acknowledging the vote of thanks, Mr. Winkworth said he would first avail himself of the occasion to assure Mr. Mackenzie that he would not fail to represent to the examiners through the council, the wish of the committee of management to have the conditions of the French examinations revised and the reasons for it. He would next express his entire satisfaction with the business of the evening, which afforded him a treat he had not expected when he entered the room. The proud position which that institution occupied in the recent Society of Arts Examinations, was due partly to the superintendence of the committee and secretary, but principally to that spirit of inquiry which actuated all the classes. He sincerely congratulated the successful candidates, as the accidental organ of the council, on the success they had achieved, and earnestly entreated them to pursue, if possible, with increased ardour, the honourable path on which they had entered. Education was the work of a life if the motto "It is never too late to learn" was literally true. New discoveries in Art and Science were continually being made, and their rapidity and importance it was difficult to conceive or over estimate. We must not only keep ourselves *au courant* with them, but should assist in their development. He concluded the business of the meeting by thanking the audience for the indulgent attention they had lent to his efforts to discharge the duties which so unexpectedly devolved upon him.—This was duly seconded and carried unanimously. The formal notices of the next week's business were read, and the meeting separated.

Nailswotrh (Literary and Mechanics' Institute).—The annual general meeting of this Institution was held on Tuesday evening, September 7th, at the Nailsworth Subscription Rooms. In the absence of the president, the chair was taken by Mr. E. Barnard, vice-president. The secretary, Mr. A. Leonard, read the report of the past year's proceedings, which speaks of a steady increase in the number of subscribers, a good attendance at the society's lectures and discussions, and an increased circulation of books, all of which show that the objects of the Institution are thoroughly understood and appreciated. The present number of members is 161, who are divided into thirty 20s., forty-two 10s., and eighty-nine 4s. subscribers, being an increase of 26 members upon the last year's subscribers. The financial prospect of the society is satisfactory. After defraying all the expenses of the year, a balance remains in the hands of the treasurer. The library has received a small addition during the past year, but the ample supply already at the disposal of the members, has met their requirements, and a fresh class of books can only be obtained by some special effort for that purpose, as the more general funds of the society are not sufficient to meet any unusual demand. The usual course of lectures has been well attended, those that have been gratuitously delivered being especially popular. The good attendance at the discussions has satisfied the committee that this branch of the society is still approved by the members. The committee finding that the formation of classes for mutual and other instruction is much needed, and having no rooms at their disposal in which such classes could meet; and having also long felt the need of a committee-room and ante-room for the accommodation of lecturers, &c., have proposed to fit up the unoccupied portion of the subscription-rooms as class and committee-rooms, and are obtaining subscriptions for this purpose. It is thought that these rooms would also be useful in accommodating a Sick Benefit Society and Penny Bank, and might also serve as a Museum of objects of local interest. From the financial statement it appears that the receipts have been about £98, and the disbursements about £95. The officers and committee for the ensuing year were then elected, and arrangements made for commencing the new session. After a vote of thanks to the chairman, the meeting separated.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Oct.* 8, 1858.]

Dated 12th July, 1858.

1561. M. A. F. Mennons, 39, Rue de l'Echiquier, Paris—An apparatus for stopping leaks in ships. (A com.)

Dated 21st September, 1858.

2117. T. Cook, Addiscombe, Surrey—Imp. in the method of preparing and securing bankers' and other crossed cheques against fraudulent erasure or removal.

2119. L. De Pariente, Paris—Imp. in apparatus to be applied to gas burners, with the object of increasing the lighting power of the gas flame. (A com.)

2121. John Bethell, 8, Parliament-street, Westminster—Imp. in treating pyrites.

2123. J. Dewrance, Barge-yard, London—An imp. in the construction of pianoforte frames.

Dated 22nd September, 1858.

2125. J. Johnson, Manchester—Imp. in machinery or apparatus for washing, churning, colour-mixing, or similar purposes.

2127. J. Hope, Rhode Island, U.S.—An improved calico printing roller.

2129. T. Howe, Millwall, Poplar—Imp. in smiths' forges.

2131. J. Tyssen, Rotterdam, Holland—An improved apparatus for indicating the speed of ships and other vessels.

2133. L. Castelain, 53, Newman-street, Oxford-street—Converting all vegetable fibre, by aid of chemicals, into form to resemble horsehair.

2135. A. B. Childs, Gower-street, Middlesex—Imp. in winnowing machinery.

Dated 23rd September, 1858.

2137. A. F. Jaloureau, Paris—Imp. in the manufacture of pipes.

2139. T. C. Hinde, Dudley, Worcestershire—An imp. or imps. in the manufacture of iron and steel.

2141. J. Wilson, 55, John-street, Sunderland—Imp. in floating docks.

WEEKLY LIST OF PATENTS SEALED.

[*From Gazette, Oct.* 8, 1858.]

October 5th.

763. W. Ager.
778. F. A. Lecornu.
782. W. Rowett.
783. A. Manbré.
787. S. Bickerton.
789. T. Kay.
791. P. Ratel.
795. T. T. Jopling.
797. P. Schafer and F. Schafer.
812. J. Knight.
822. A. H. A. Durant.
826. G. G. Brown.
840. W. Carron.
866. J. B. Smith.
867. D. Moore.
907. R. Bodmer.
935. M. Sautter.
1026. W. E. Newton.
1035. W. E. Newton.
1122. J. Hesford.
1196. C. Clarke.
1590. J. Rheinauer.
1623. C. Reeves.
1634. T. Bailey.
1754. W. Taylor.
1856. M. A. F. Mennons.

[*From Gazette, Oct.* 12, 1858.]

October 12th.

732. C. H. Chadburn.
802. G. Pye, R. Smith, and B. Croasdale.
803. W. C. Holmes and W. Hollinshead.
806. J. Gorham.
808. J. Gray.
810. E. Green.
817. L. Cowell.
827. G. Walker.
829. A. P. Price.
834. J. Grassay.
836. F. C. Gilbert.
837. D. Chalmers and J. T. Swallow.
839. J. R. Chirm.
846. T. Luck.
915. J. Braidwood.
1425. P. Griffiths.
1570. J. A. Fussell.

Patents on which the Stamp Duty of £50 has been Paid.

[*From Gazette, Oct.* 8, 1858.]

October 4th.

2224. P. A. Halkett.

October 6th.

2243. W. Rothera.

[*From Gazette, Oct.* 12, 1858.]

October 7th.

2245. J. H. Johnson.

October 8th.

2267. J. Thornton, A. Thornton, W. Thornton, and H. Thornton.

October 9th.

2309. W. Cotton.
2354. T. Valentine, D. Foster, and G. Haworth.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

No. in the Register.	Date of Registration.	Title.	Proprietors' Name.	Address
4120	Sept. 22.	The Eureka Buckle	C. Rowley and Co.	Newhall-street, Birmingham.
4121	Oct. 7.	The Hercules Shirt, without gathers	J. Bremner	13, Eldon-street, Kensington.
4122	" 9.	The Uniform Front	T. R. Barlow	143, Tooley-street, Southwark.